CLAIMS

What is claimed is:

1. A method of introducing legacy-compatible supplemental training waveform components into ATSC-compatible DTV transmission waveforms by exploiting ancillary data capability in said standard.

2. A method of introducing said legacy-compatible supplemental training waveform components per claim 1 by anticipating transmission signal processing, and compensating for same, in the generation and queueing of relevant ancillary data packets so as to induce the designed training waveform components, while preserving enough information in relevant ancillary data packets so as to allow legacy and future receivers to distinguish these training waveform induction packets from desired information-bearing packets.

3. A method of introducing said legacy-compatible supplemental training waveform components per claim 1 at the transmission point by introducing appropriate "placeholder" packets in the packet data stream, then generating intentionally designed supplemental training waveform components in the modulation waveform at time instances corresponding to those which map from the "placeholder" training symbol induction packets while passing sufficient data,

undisturbed, from same placeholder packets so as to cause legacy and future receivers to distinguish those placeholder packets from desired information-bearing packets.

4. A method of introducing zero, one or more selectable legacy-compatible supplemental training waveform components into ATSC-compatible DTV transmission waveforms per the method of claim 1, said training waveforms selected from a plurality or ensemble of selections, where each selection or combination of selections is identifiable to the receiver through signaling means available through spare capacity in the ATSC DTV field sync segment or otherwise.

5. A method of introducing zero, one or more selectable legacy-compatible supplemental training waveform components into ATSC-compatible DTV transmission waveforms per the method of claim 1, said training waveforms selected from a plurality or ensemble of selections, where each selection or combination of selections is identifiable to the receiver through signaling means available through information payload packets, or portions of information payload packets, designated for use as such.

6. A method of introducing zero, one or more selectable legacy-compatible supplemental training waveform components into ATSC-compatible DTV

transmission waveforms per the method of claim 1, said training waveforms selected from a plurality or ensemble of selections, where each selection or combination of selections is identifiable to the receiver through its correlation properties.

7. A method of gradually improving multipath resilience of ATSC DTV standard broadcast and reception systems by gradually introducing, over time, various legacy-compatible supplementary training or reference waveforms for inclusion, selectably or otherwise, per the method of claim 1.

8. A method of designing legacy-compatible supplemental training waveform components for introduction per method of claim 1 so as to derive maximum benefit, with respect to equalization subject to known channel multipath characteristics, through appropriate selection of length, periodicity and processing gain of same said supplemental training waveform components, said selection subject to pre-existing ATSC DTV transmission signal periodicities and configuration.

9. A method of exploiting, at the receiver, said legacy-compatible supplemental training waveform components introduced per method of claim 1 by employing those components to more quickly, frequently and/or reliably train pre-demodulation equalizers.

10. A method of exploiting, at the receiver, said legacy-compatible supplemental training waveform components introduced per method of claim 1 by passing the received transmission waveform through a correlator, digital or otherwise, to extract multipath channel response characteristics for use in more quickly, frequently and/or reliably training pre-demodulation equalizers.

11. A method of exploiting, at the receiver, said legacy-compatible supplemental training waveform components introduced per method of claim 1 by passing the received transmission waveform through a digital correlator, said correlator implemented with reduced complexity based on the use of bit shifts and sign changes instead of multiplication, yielding a correlator implementation limited to addition operations or to addition operations and a minimum number of bit shifts, and said correlation process for the purpose of extracting multipath channel response characteristics for use in more quickly, frequently and/or reliably training pre-demodulation equalizers.

12. The method of modifying the ATSC DTV standard transmission format by reducing pilot signal amplitude by 20% in the interest of subsequently reducing computational complexity required of correlation-based training-waveform processing, or in the interest of improving the accuracy of said reduced-

complexity correlators over the accuracy possible with the presently specified pilot amplitude.

13. A method of introducing legacy-compatible supplemental training waveform components into digital transmissions in general by exploiting packet-based information payloads.

14. A method of introducing said legacy-compatible supplemental training waveform components per claim 13 by anticipating transmission signal processing, and compensating for same, in the generation and queueing of relevant ancillary data packets so as to induce the intentionally designed training waveform components while preserving enough information in relevant ancillary data packets so as to allow legacy and future receivers to distinguish these training waveform induction packets from desired information-bearing packets.

15. A method of introducing said legacy-compatible supplemental training waveform components per claim 13 at the transmission point by introducing appropriate "placeholder" packets in the packet data stream, then generating designed supplemental training waveform components in the modulation waveform at time instances corresponding to those which map from the "placeholder" training symbol induction packets while passing sufficient data, undisturbed, from same

placeholder packets so as to cause legacy and future receivers to distinguish those placeholder packets from desired information-bearing packets.

16. A method of introducing zero, one or more selectable legacy-compatible supplemental training waveform components into digital transmission waveforms per the method of claim 13, said training waveforms selected from a plurality or ensemble of selections, where each selection or combination of selections is identifiable to the receiver through signaling means available through spare capacity in the modulation fields designed to convey configuration and control overhead information.

17. A method of introducing zero, one or more selectable legacy-compatible supplemental training waveform components into digital transmission waveforms ATSC-compatible DTV transmission waveforms per the method of claim 13, said training waveforms selected from a plurality or ensemble of selections, where each selection or combination of selections is identifiable to the receiver through signaling means available through information payload packets, or portions of information payload packets, designated for use as such.

18. A method of introducing zero, one or more selectable legacy-compatible supplemental training waveform components into digital transmission waveforms per the method of claim 13, said training waveforms selected from a plurality or

ensemble of selections, where each selection or combination of selections is identifiable to the receiver through new signaling means introduced into the legacy modulation waveform.

19. A method of introducing zero, one or more selectable legacy-compatible supplemental training waveform components into digital transmission waveforms ATSC-compatible DTV transmission waveforms per the method of claim 13, said training waveforms selected from a plurality or ensemble of selections, where each selection or combination of selections is identifiable to the receiver through signaling means available through newly configured information payload packets, or new portions of legacy standard information payload packets, introduced for use as such.

20. A method of introducing zero, one or more selectable legacy-compatible supplemental training waveform components into ATSC-compatible DTV transmission waveforms per the method of claim 13, said training waveforms selected from a plurality or ensemble of selections, where each selection or combination of selections is identifiable to the receiver through its correlation properties.

21. A method of designing legacy-compatible supplemental training waveform components for introduction per method of claim 13 so as to derive maximum

benefit, with respect to equalization subject to known channel multipath characteristics, through appropriate selection of length, periodicity and processing gain of same said supplemental training waveform components, said selection subject to pre-existing digital transmission signal periodicities and configuration and to payload packet periodicities and configuration.

22. A method of exploiting, at the receiver, said legacy-compatible supplemental training waveform components introduced per method of claim 13 by employing those components to more quickly, frequently and/or reliably train pre-demodulation equalizers.

23. A method of exploiting, at the receiver, said legacy-compatible supplemental training waveform components introduced per method of claim 13 by passing the received transmission waveform through a correlator, digital or otherwise, to extract multipath channel response characteristics for use in more quickly, frequently and/or reliably training pre-demodulation equalizers.

24. A method of exploiting, at the receiver, said legacy-compatible supplemental training waveform components introduced per method of claim 13 by passing the received transmission waveform through a digital correlator, said correlator implemented with reduced complexity based on the use of bit shifts and sign changes instead of multiplication, yielding a correlator implementation limited to

addition operations or to addition operations and a minimum number of bit shifts, and said correlation process for the purpose of extracting multipath channel response characteristics for use in more quickly, frequently and/or reliably training pre-demodulation equalizers.